

TITLE OF THE INVENTION

A SURVEILLANCE CAMERA APPARATUS HAVING A  
SELECTING OPERATION OF IMAGE INFORMATION IN A RECEIVING  
SIDE

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BACKGROUND OF THE INVENTION

The present invention relates to a surveillance  
camera apparatus. More specifically, the present  
invention relates to a surveillance camera apparatus  
10 which monitors all images obtained by an imaging unit,  
selectively masks the area of part of an image for the  
purpose of image picking-up forbiddance and privacy  
protection, and prevents it from being recorded or  
outputted.

15 A large number of surveillance apparatuses  
using an imaging unit are used for surveillance of an  
intruder or an intruding object (hereinafter, called an  
intruding object) into a Keep Out area of a public  
building and location, a bank, a store such as a  
20 supermarket, a dam, a base station, and an airport.  
When such surveillance apparatus is installed for  
surveillance of a public location, a neighboring house  
or a location causing a privacy problem is within the  
field of view of the surveillance apparatus and may  
25 often be image picked-up together in the range for  
surveillance. This can be the cause of a complaint.

To prevent a neighboring house or a location  
causing a privacy problem from being displayed on the

image screen of a surveillance apparatus for the purpose of privacy protection, there is proposed a method for performing processing of limiting an image picking-up direction or removing, from the image screen,  
5 an object which must not be image picked-up, e.g., the periphery of a neighboring house, by image processing. The method will be described below in detail using FIG. 7.

FIG. 7 shows a schematic construction diagram  
10 of a prior art surveillance camera imaging apparatus. In FIG. 7, the numeral 60 denotes a lens unit, and the numeral 61 denotes an image pick-up element such as a CCD (charge coupled device). An incident light from the field of view of imaging is incident via the lens unit  
15 60 upon the image pick-up element 61. The image pick-up element 61 converts the incident light subjected to adjustment of the angle of view by the lens unit 60 to an image signal, which then inputs it to an image processing unit 62. The image processing unit 62  
20 subjects the inputted image signal to image processing such as white balance adjustment and gamma correction. The image signal subjected to the image processing is inputted to a mask unit 63. The mask unit 63 has a function of masking part of an image privacy-protected  
25 in the field of view of imaging incident via the lens 60. The image signal masked by the mask unit 63 is displayed as a surveillance image on a display unit 65. The numeral 64 denotes a camera unit and has the image

pick-up element 61, the image processing unit 62, and the mask unit 63.

5 A controller 67 has a function of setting the control of the pan direction and the tilt direction of the camera unit 64, the zoom of the lens unit 60 and the mask range of the mask unit 63. The camera unit 64 is attached to a pan head, not shown, for freely moving it in the pan direction and the tilt direction. The pan head is driven by a camera driving mechanism 66 in  
10 which the pan and tilt directions are controlled by the controller 67.

Assume that the controller 67 controls the camera driving mechanism 66 of the pan head to adjust the direction of the field of view of the camera unit  
15 64, and controls zooming of the lens unit 60, wherein an image screen A shown in FIG. 8 is picked-up by the camera unit 64. The case that the image screen A has privacy-related information will be described below. In FIG. 8, the range indicated by P shows a range of  
20 privacy-related information. In this example, the image screen A is incident via the lens unit 60 upon the image pick-up element 61.

In the case of picking-up the intruding object for surveillance, a privacy part must be masked in the  
25 camera for privacy protection to output an image of the object. An incident light in the range P of the privacy-related information must be blocked on the image screen A of FIG. 8. To mask this part, the

controller 67 controlling the mask unit 63 applies a necessary control signal to the mask unit 63. The part of the range P of the privacy-related information is masked, for example, the image signal of this part is removed for display on the display unit 65 without displaying the privacy-related information.

In the above prior art surveillance camera apparatus, the privacy-related information has already been subjected to processing such as removing in the camera unit 64 to be a masking image. When the image signal outputted from the camera unit 64 is transmitted via a network, is displayed on the monitor or is recorded, the privacy-related information has already been erased. A side receiving transmission of the image cannot obtain a detailed image of its part. In criminal investigation, it may be desired that even privacy-related information be obtained by limiting its application. The side receiving transmission of the image cannot select the image.

#### SUMMARY OF THE INVENTION

An object of the present invention is to provide a surveillance camera apparatus in which a side receiving transmission of privacy-related image information can select the image information.

Another object of the present invention is to provide a surveillance camera apparatus which can easily select privacy-related image information.

A further object of the present invention is to provide a surveillance camera apparatus which can be used as various surveillance cameras by selecting a mode.

5           To achieve the above objects, a surveillance camera apparatus of the present invention which has an image signal transmission apparatus for transmitting an image signal and an image signal reception apparatus for receiving an image signal from the image signal transmission apparatus, wherein the image signal transmission apparatus comprises an image pick-up unit for picking-up an object; a position input unit for specifying a predetermined range from an output signal from the image pick-up unit; and an image signal output unit for outputting position information obtained from the position input unit superimposed on the image signal obtained from the image pick-up unit, and the image signal reception apparatus has a position information detector for detecting position information from an image signal to which the position information transmitted from the image signal transmission apparatus is added; a recorder for recording the image signal; and a controller for selecting any one of the image signal and a signal masking a predetermined range of the image signal based on said position information from the position information detector, and for recording it into the recorder.

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In a surveillance camera apparatus of the

present invention, position information obtained from the position input unit is superimposed on a vertical blanking period of the image signal obtained from the imaging unit.

5           In a surveillance camera apparatus of the present invention, the image signal reception apparatus further has a mode selector, and the controller selects at least any one of a mode recording into the recorder without masking and a mode recording into the recorder  
10 with masking based on a selection signal from the mode selector.

          In a surveillance camera apparatus of the present invention, the controller further has a security setting unit, and the mode recording into the  
15 recorder without masking is set by the control of the security setting unit.

          In a surveillance camera apparatus of the present invention, the image signal reception apparatus further has a memory unit for position information for  
20 storing position information from the detector for position information, a first selector for selectively outputting any one of the image signal and an image signal masking a predetermined part from the image signal based on the position information, and a second  
25 selector for recording an image signal selected by the selector into the recorder to selectively output any one of an output image signal from the recorder and an image signal masking a predetermined part from the

output image signal based on the position information.

An image signal transmission apparatus of the present invention has: an image pick-up unit for picking-up an object; a position input unit for specifying an image picking up forbiddance range from an output signal from the image pick-up unit; a position information adding unit for superimposing position information obtained from the position input unit on an image signal obtained from the image pick-up unit; and an image signal output unit for outputting an image signal to which the position information is added.

In an image signal transmission apparatus of the present invention, position information obtained from the position input unit is superimposed on a vertical blanking period of an image signal obtained from the image pick-up unit to be outputted.

An image signal reception apparatus of the present invention has: an image signal input unit for inputting an image signal to which position information in an image pick-up forbiddance range is added; a position information detector for detecting position information from the image signal; a recorder recording the image signal; and a controller for any one of the image signal and a signal masking an image picking-up forbiddance range of the image signal based on position information from the position information detector to record it into the recorder.

An image signal reception apparatus of the

present invention further has a mode selector, and the controller selects at least any one of a mode recording into the recorder without masking and a mode recording into the recorder with masking based on a selection  
5 signal from the mode selector.

In an image signal reception apparatus of the present invention, the controller further has a security setting unit, and the mode recording into the recorder without masking is set by the control of the  
10 security setting unit.

An image signal reception apparatus of the present invention has: a memory unit for position information storing position information from the detector for position information; a first selector for  
15 selectively outputting any one of the image signal and an image signal masking a predetermined part from the image signal based on the position information; and a second selector for recording an image signal selected by the selector into the recorder to selectively output  
20 any one of an output image signal from the recorder and an image signal masking a predetermined part from the output image signal based on the position information.

The above and other objects, features and advantages of the present invention will be apparent  
25 from the following detailed description of illustrative embodiments which is to be read in connection with the accompanying drawings.



## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram showing an image signal transmission apparatus of an embodiment according to the present invention;

5           FIG. 2 is a block diagram showing an image signal reception apparatus of an embodiment according to the present invention;

          FIG. 3 is a diagram of assistance in explaining an embodiment of a privacy-related image range  
10           according to the present invention;

          FIG. 4 is a block diagram showing an embodiment of a detector for position information according to the present invention;

          FIG. 5 is a diagram of assistance in explaining  
15           a vertical blanking period on which position information is superimposed according to the present invention;

          FIG. 6 is an elongated diagram of assistance in explaining the vertical blanking period on which  
20           position information is superimposed according to the present invention;

          FIG. 7 is a block diagram showing the schematic construction of a prior art surveillance camera imaging apparatus; and

25           FIG. 8 is a diagram showing the range of privacy-related information picking-up by a camera.

## DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

FIG. 1 shows a block diagram showing an embodiment according to the present invention. The numeral 1 denotes an image signal transmission apparatus which picks-up an object 2 by a camera unit 3. 5 An image signal from the camera unit 3 which has picked-up the object 2 is applied to a position data adding unit 4 for area and a position information generator 6 for area, respectively. The position data adding unit 4 for area converts it to an image signal to which position information of a privacy-related 10 image part is added. The detail of the position data adding unit 4 for area will be described later. The image signal from the position data adding unit 4 for area is subjected to signal processing for transmission 15 by an image signal output unit 5, and is then transmitted via a transmission path 9 to a reception apparatus.

The position information generator 6 for area has a position input unit 7 for area and a position data generator 8 for area. As the position input 7 unit 20 for area, an input unit, which has been known, such as a touch panel, can be used. The image signal from the camera unit 3 displays an image of the object 2 (or called subject) on the position input unit 7 for area such as a touch panel. FIG. 3 shows its state. 25

In FIG. 3, the position input unit 7 for area displays the entire display image screen and can input position information on the image screen. In the case

of the NTSC television system having 525 scanning lines,  
two fields forms one image screen. As information of  
one field, the horizontal axis is divided into 100  
points and the vertical axis is divided into 262.5  
5 points, thereby inputting position information. When  
privacy-related image part P shown in FIG. 3 is  
inputted on a touch panel, (X1, X2) (Y1, Y2) are  
inputted as (20, 40) (100, 200). In this embodiment,  
for simplification, the privacy-related image part P is  
10 displayed in a rectangle. Generally, it is formed so as  
to identify a part touched at 3 points or more as area  
information.

When the position input unit 7 for area inputs  
(X1, X2) (Y1, Y2) as position information, as described  
15 above, the position data generator 8 for area generates  
position data for area added to the image signal. The  
operation of the position data adding unit 4 for area  
and the position data generator 8 for area will be  
described here using FIGS. 5 and 6. FIG. 5 is a diagram  
20 showing vertical blanking period V (20H) of image  
signals. The image signals are omitted for display.  
Here, H indicates one horizontal scanning period.

In FIG. 5, the vertical blanking period V has  
the first to the 20th scanning lines and has a pre-  
25 equalizing pulse (3H), a vertical synchronizing pulse  
(3H), a post-equalizing pulse (3H), and other pulses.  
The 10th to the 20th scanning lines are generally  
periods which can be freely used in a user side.

Actually, they are used for superimposing a signal of time code information of a VTR and copy prohibition information of VTR software. The present invention shows an example in which the 12th and 13th scanning  
5 line periods of the vertical blanking period V are used to transmit position information (X1, X2) of the privacy-related image part P, and the 14th and 15th scanning line periods are used to transmit position information (Y1, Y2) of the privacy-related image part  
10 P. FIG. 5 shows signals obtained by synthesizing the position information X1 and X2 with periods A and B, respectively. S indicates a burst signal.

FIG. 6 shows an elongated figure of the period A shown in FIG. 5. In FIG. 6, a period continued from  
15 horizontal blanking time t is divided into 50 every  $1\mu s$ , and the position information X1 in the X axis direction is superimposed thereon. A signal resulting from the coding of the position information X1 in the X axis direction in the position data generator 8 for area is  
20 inputted to the position data adding unit 4 for area. The position data adding unit 4 for area superimposes the position information of the X1 position of the privacy-related image part P on the image signal from the camera unit 3. There are various methods for coding and superimposing the position information. To express  
25 (X1: 20) of FIG. 3, when 20 is subjected to binarization to be 10100 and the first of FIG. 6 is a least significant bit, pulse "1" is superimposed on the

third and the fifth and others are "0" to express 20. To express (X2: 40) thereof, 40 is subjected to binarization to be 101000. Pulse "1" is superimposed on the fourth and the sixth and others are "0" to express  
5 40. In the same manner, the position information (Y1, Y2) of the Y position of the privacy-related image part P, a pulse is superimposed on the horizontal blanking periods of the 14th and 15th, not shown, of the vertical blanking period. The display method by  
10 binarization is described here. Needless to say, this is not limited.

As described above, the image signal resulting from the addition of the position information of the privacy-related image part P to the image picked-up by  
15 the camera unit 3 is converted to a signal form suitable for transmission by the image signal output unit 5 and is then outputted as a transmission signal via the transmission path 9 to a network. It is known that the image signal converted by the image signal  
20 output unit 5 is converted to an analog signal, a digital signal, or a compressed signal.

FIG. 2 is a block diagram showing an embodiment of an image signal reception apparatus. An image signal transmitted from the image signal transmission  
25 apparatus 1 is inputted to an image signal input unit 22 of an image signal reception apparatus 21 shown in FIG. 2. The image signal input unit 22 performs necessary signal processing, which has been known, to

the transmitted image signal, and then converts it to an analog image signal. The output is outputted to a separator 23 for position data of area. The image signal outputted from the image signal input unit 22 is  
5 the image signal on which the position information of the privacy-related image part P is superimposed by the position data adding unit 4 for area of the image signal transmission apparatus 1. The separator 23 for position data of area separates the position  
10 information of the privacy-related image part P, that is,  $(X1, X2) (Y1, Y2)$ , from the transmitted image signal. The output of the separator 23 for position data of area is applied to a switching unit 24 and an extractor 25 for image area, respectively.

15           The position information of the privacy-related image part P separated by the separator 23 for position data of area is applied to a detector 26 for position information. The detailed construction of the detector 26 for position information will be described using FIG.  
20 4. The position information of the privacy-related image part P separated by the separator 23 for position data of area is applied to a position signal separator 41, and is then separated into a vertical blanking signal 42 and a horizontal blanking signal 43 to be  
25 inputted to a counter 44. The counter 44 extracts the 12th to 15th horizontal scanning periods of the vertical blanking period explained in FIG. 5, detects pulse positions subjected to binarization and

superimposed in the horizontal blanking period shown in FIG. 6, detects an X pulse position 45 and a Y pulse position 46, and outputs them to a position signal reproducer 47. The position signal reproducer 47  
5 reproduces the position information of the original privacy-related image part P, that is, (X1, X2) (Y1, Y2), from the X pulse position 45 and the Y pulse position 46. The position information is stored into a memory unit 28 for position data of area of a  
10 controller 27.

The switching unit 24 to which the analog image signal from the separator 23 for position data of area and the image signal from the extractor 25 for image area are applied, switches the necessary image signal  
15 based on the control of the controller 27 to record it into a recorder 29. The operation of the controller 27 will be described later. The extractor 25 for image area to which the analog image signal from the separator 23 for position data of area is applied,  
20 outputs an image signal resulting from the extraction of the privacy-related image part P from the analog image signal based on the position information of the privacy-related image part P outputted from the controller 27.

25 The recorder 29 records the image signal from the switching unit 24 based on the control of the controller 27 or reproduces the contents recorded, and then applies the reproduced image signal to a switching

unit 30 and an extractor 31 for image area. The extractor 31 for image area is a circuit for extracting the privacy-related image part P from all the analog image signals recorded from the separator 23 for position data of area via the switching unit 24 into the recorder 29. As in the extractor 25 for image area, it outputs an image signal resulting from the extraction of the privacy-related image part P from all the analog image signals reproduced from the recorder 29 based on the position information of the privacy-related image part P outputted from the controller 27 to apply it to the switching unit 30. The switching unit 30 selects, based on the control of the controller 27, all the analog image signals from the recorder 29 or the signal from the extractor 31 for image area to display a surveillance image via an image signal output unit 32 on a monitor 33. When necessary, it is transmitted via a transmission path 36 to another reception apparatus.

The controller 27 is provided with a security setting unit 34. A mode selector 35 can suitably set the operation of the controller 27. The security setting unit 34 sets a special condition so that only a person who can see the privacy-related image part P, for example, a person who is legally authorized or is allowed to see it under the special condition, can see it.

The operation of the image signal reception



apparatus 21 will be described based on the function of the controller 27. The image signal reception apparatus 21 is constructed to select three modes by mode selection of the mode selector 35. The three modes have the following functions.

mode 1: All images are recorded and reproduced into/from the recorder without masking.

mode 2: All images are recorded into the recorder without masking and a necessary range is masked in reproduction.

mode 3: An image signal is recorded with masking and is reproduced with masking.

The case of selecting the mode 1 will be described. When using the surveillance camera apparatus of the present invention in the location where the privacy-related image part P does not exist within the range picked-up by the camera unit 3, the privacy-related image part need not be set. Since masking is unnecessary for the screen displayed in such location, the mode 1 is selected for use. In this case, the controller 27 controls the switching units 24 and 30 to apply an image signal from the separator 23 for position data of area via the switching unit 24, the recorder 29 and the switching unit 30 to the image signal output unit 32.

The case of selecting the mode 2 will be described. When the privacy-related image part P exists within the range picked-up by the camera unit 3,

position information of the privacy-related image part P is transmitted together with the image signal, as explained in FIG. 1. In the image signal reception apparatus 21, the position information of the privacy-related image part P is stored into the memory unit 28 for position data of area of the controller 27. The controller 27 controls the switching unit 24 to record all the analog image signals directly from the separator 23 for position data of area into the recorder 29 or to record an image signal masking the privacy-related image part P from the extractor 25 for image area. When recording all the analog image signals, the switching unit 30 switches, based on the control of the controller 27, whether all the analog image signals are reproduced as reproduction signals or the image signal masking the privacy-related image part P is outputted from the extractor 31 for image area, for display on the monitor or transmission to the outside. When using the mode 2, the privacy-related information can be freely seen or masked. In this case, high-degree security protection of the security setting unit 34 is set. Needless to say, the privacy-related information can be seen only under legal authorization or the special condition.

The case of selecting the mode 3 will be described. When the privacy-related image part P exists within the range picked-up by the camera unit 3, the switching unit 24 is controlled based on the control of

the controller 27 to record, into the recorder 29, an image signal masking the privacy-related image part P by the extractor 25 for image area for reproducing it in the masked state.

5 As described above, in the present invention, regardless of the existence or inexistence of the privacy-related image part P, all the analog image signals are transmitted to the image signal reception apparatus 21. The image signal reception apparatus 21, as explained about the modes 1, 2 and 3, can reproduce a necessary image by the operation of the mode selector 35. For reproduction or transmission of privacy-related image information, setting of the security setting unit 34 can set the special condition such that only a person who is allowed to see it under the special condition. It can be realized as a very safe surveillance apparatus. The surveillance camera and can apparatus of various surveillance cameras and can application of various surveillance cameras and can select a use condition by mode selection.

10 The present invention is described above in detail. The present invention is not limited to the embodiment of the surveillance apparatus described herein. Needless to say, the present invention can be applied widely to an apparatus or a detection method for detecting the change in the field of view of an imaging unit.

15 As described above in detail, the present

invention is a surveillance camera apparatus which can protect privacy-related information. It can be constructed such that all image information is transmitted so as to see privacy-related information only under legal authorization or under the special condition, whereby it can be suitably selected and seen in a receiving side. In addition, the present invention is a surveillance camera apparatus which can mask information which is not allowed to see and can realize a surveillance camera apparatus which can be used for many purposes.

It will be appreciated while particular embodiments of the invention have been shown and described, modifications may be made. It is intended in the claims to cover all modifications which come within the true spirit and scope of the invention.